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Title: IC Project Results w17_unedetection -“Simulation of underground nuclear explosions using the combined finite discrete element method” and “Fracture Formation and Permeability Evolution at in situ Pressure, Temperature and Stress Conditions”

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IC Project Results

w17_unedetection - "Simulation of underground nuclear explosions using the combined finite discrete element method" and "Fracture Formation and Permeability Evolution at in situ Pressure, Temperature and Stress Conditions"

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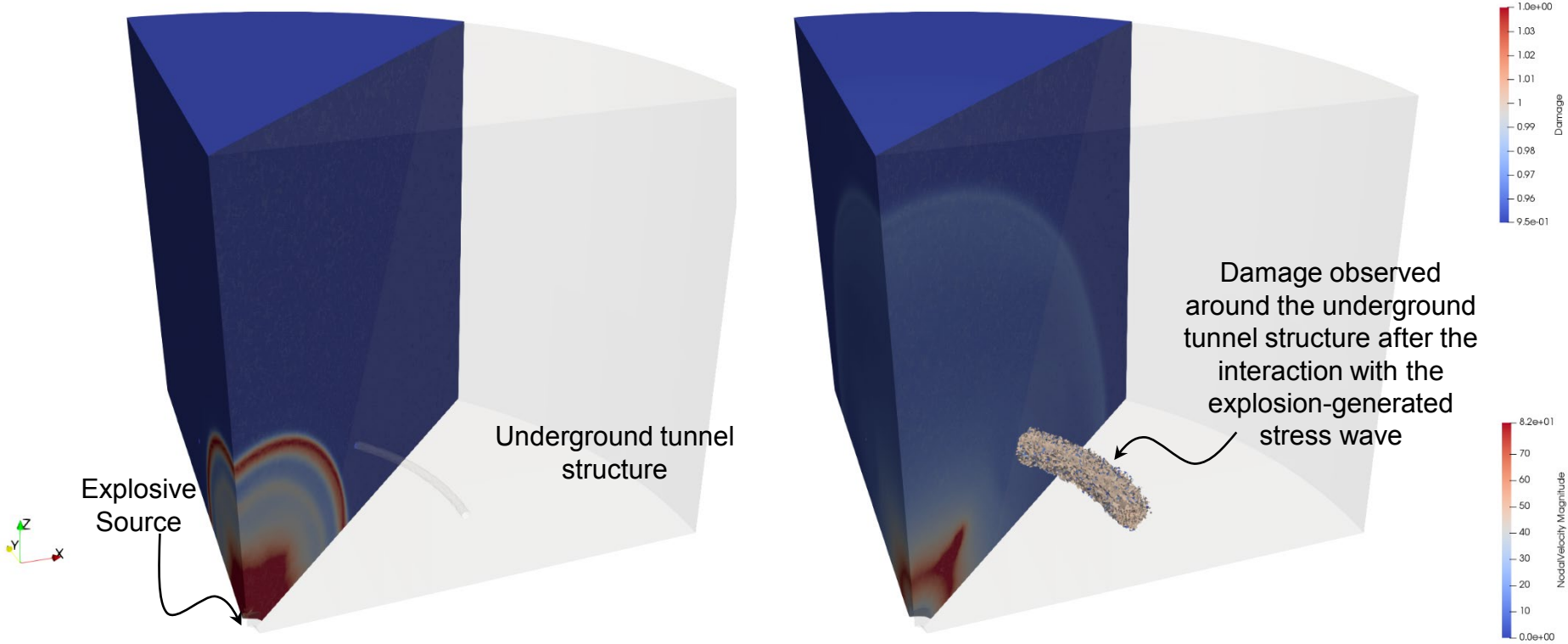
Hydrodynamic modeling (UNESE)

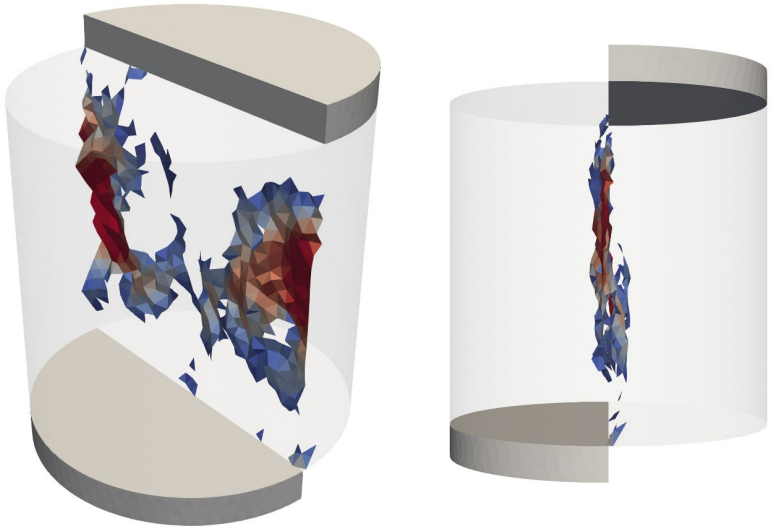
Large scale simulations are conducted to model the effects of UNE on an underground structure



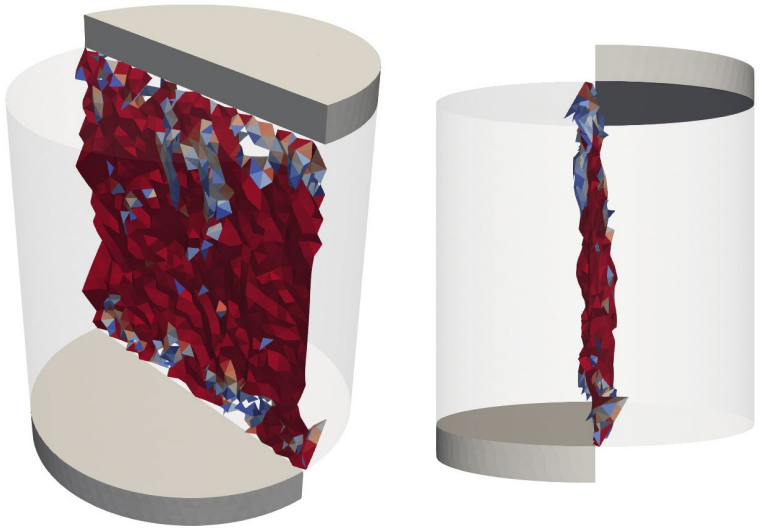
An explosive source for a legacy nuclear test is used as an input in this 3D model to study the consequences of the interaction between the stress waves and pre-existing underground man-made structures. Left: early stages of the wave propagation. Right later stages of the wave propagation where the damage around the underground tunnel structure can be clearly observed.

Basic Energy Sciences (BES)

Fracture initiation and propagation under triaxial direct-shear loading conditions



Onset of fracturing across the middle plane of the sample. Fractures are initiated from the center of the sample where the maximum principal stresses are positive (tension)



Failure map at the end of the simulation. A very well defined plane of fractures is observed from the simulations.